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Acknowledgement Behavior of Authors in the Literature of Computer Science: A Bibliometrics Analysis

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Abstract.
Bibliometrics analysis was conducted on the acknowledgements made by authors in their journal articles that appeared in the printed version of the *International Journal of Computer Vision*. The study considered the range of six years for the analysis; 2001-2006.Frequency of appearance of the acknowledgement citation was thoroughly assessed and discussed. The results of the study indicate that, 68% of the journal articles contain acknowledgements; and averagely the literature has 2.3 acknowledgements per journal article. The most common category of acknowledgement during the period of the study was the financial support category. The study further reveals that acknowledgement activity is seriously practiced by the scientists in the literature.
Keywords: acknowledgement: authors: computer science: bibliometrics

Introduction.

Acknowledgement refers to statement of recognition to an individual or a group, for their contributions to the successful completion of a research. Some of the acknowledgement statements can be found in textbooks and speeches. It is also a common practice among the university students to acknowledge contributions made by their parents, families, supervisors and sponsors towards successful completion of their degree awarding decitations, projects and theses. Statements of appreciation are also found at the end of films and dramas to the people that contributed towards successful completion of the various episodes, actions and plays in such films and dramas. Similarly, appreciation statements are also found in the proceedings of workshops, seminars and conferences. Other aspects in which acknowledgement statements appear include the web sites, programming languages, database, journal articles, reports, maps, and experiments. Acknowledgement gives perceptions and understanding of the extent to which a certain task is completed. Acknowledgement statement exposes various efforts and contributions of individuals, groups and governments towards successful completion of a project. Cronin, et al (1993) says that, "Acknowledgements do give others a perception of the many contributions by others to the work completed and reflect a rich mix of personal, moral, instrumental, financial, technical and conceptual support received from institutions, agencies, co-workers, peers, family members, subject and mentors," In addition to the above quoted statement many scholars made some attempts to categorize acknowledgements statements in different categories for easy understanding and adoption of the art. Among these scholars are Giles and Council (2004) who proposes six categories of acknowledgment activities, "Moral support, financial support, editorial support, presentational support (e.g. presenting a paper at a conference), Instrumental/technical support and conceptual support or peer interactive communication (PIC)."(Mackintosh; 1972, McCain; 1991, and Tiew and Sen; 1999) are also among the scholars that categorized acknowledgement activities in various groups for easy consultation, understanding and practice.

Scientists, scholars, and researchers globally maintain a common tradition of acknowledging people, sponsoring bodies, institutions and governments that contribute satisfactorily towards successful completion of their important tasks. In some instances researchers decline to acknowledge some assistance they received. This may be attributed to the level and nature of the assistance. If the assistance received turned out to be less than the expected then there is tendency for some of the researchers to decline from acknowledging this contribution in their work. Butler, Biglia and Bourke (1998) opined that, " Where the assistance received from a funding body accounted for more than 40% of the total support for the project, researchers consistently acknowledged that support. For less major sources of funds, researchers made deliberate decisions to omit mentioning the support."The attitude of refusing to acknowledge some contributors may not augur well with the funding body or individual sponsors. This attitude could discourage potential donors, philanthropists and funders of projects and researches. Some people have the view that, acknowledgement activity could be regarded as another form of citation activity. To buttress this claim, studies need to be done before considering it as a citation activity in its totality. Council et al (2004) reiterated further, that," Many funders of scientific work require acknowledgements in scientific publications, thus acknowledgement can be used to identify relationships of government and corporate entities to researchers and research output." Generally acknowledgement serves as an indicator for appreciation shown to any form of contributions received from individuals, groups, organizations, bodies and

governments. Acknowledgements are avenues that assist in making it possible to share any form of successful contribution to knowledge, new innovation and inventions made by individual scientists or group of scientists.

However, growth and development of acknowledgement as a bibliometrics technique of research was of recent affair. Blaise Cronin is considered as one of the leading champions, pioneers, developers, and initiators .Tiew and Sen (2002) opined that, "There are a few studies on the practices, patterns and norms of acknowledgements and of its existence in the sphere of scholarly writings. One of the pioneers in the study of acknowledgements is Blaise Cronin who is a professor of the school of library and information science, Indiana University, USA has conducted quite a few studies with his colleagues on acknowledgement and its importance in the field of bibliometrics studies." Some of the studies conducted on acknowledgement bibliometrically include the following ;(Cronin; 1991 Cronin, McKenzie and Rubio; 1993, Davis and Cronin; 1993, Cronin and Weaver Wozniak; 1993, 1995, Cronin and Overfelt; 1994, Cronin, Mckenzie and Stiffler; 1992, Tiew and Sen; 2002). Acknowledgement as a technique for scholarly communication bibliometrically was given much attention by the above listed scientists. Their individual and collaborative efforts made the area to spread widely and create a lot of interests and awareness among vast array of readers. The few studies quoted above, generally emphasized on the importance, relevancy and appropriateness of the acknowledgement activity as a tool that exposes influential contributions in scholarly communication. Some of the scientists suggested that the creation and generation of data for analysis in this acknowledgement studies be done automatically (electronically); moving away from the manual technique. Cronin and Weaver-Wozniak (1993, 1995) proposed that, "The development of an online acknowledgement index as a sister product to the citation index." This proposal has been actualized by many scientists who attempted to generate automatic index for acknowledgement analyses and activities.Council, et al (2004) made a very useful contribution in this aspect of automatic indexing of acknowledgement data; they said, "This paper also discusses an application of the acknowledgement extraction algorithm to documents within the *citeseer digital library.* The acknowledgements received by various entities are counted and the results are cross-referenced with citation information within *citeseer* in order to provide a relative measure of the impact each acknowledgement has within the archive." In another study, Council and Giles (2004) compared the automatic indexing processes for citation analyses and automatic indexing for acknowledgement outputs and conclude that, "Combining acknowledgement analysis with citation indexing yield a measurable impact of the efficacy of various individuals as well as government, corporate, and university sponsors of scientific work." Acknowledgements are generally personal expressions of appreciations to individual, groups, institutions, etc.that contributed indirectly to the successful completion of a given research; while citation study is purely done on direct academic contributions to a given research. Therefore comparison between citation and acknowledgement may not yield significant relationship that could match the two concepts in to one entity. Each of the two concepts constitutes an entity. In terms of visibility and reliability of scientific communications both citation and acknowledgement activities are undoubtedly playing a great role. They however inculcate on the readers some level of interest towards enhancement, empowerment, spread and accessibility of scientific communications. The two activities could be considered as appropriate for measuring acceptability of a certain communication.

Nevertheless, this study is an attempt to add to the few literatures of acknowledgement as a bibliometrics technique in the aspect of scientific communication. This study also exhibits the position or status of authors that published articles in the *International Journal of Computer Vision* as regards acknowledgement activities. Finally, the study supports the assertion that the aspect of acknowledgement as an activity positively support and enhances scholarly contributions. Studies on acknowledgements could be made as a tool for measuring the status of authorship in the literature of many subjects and disciplines and could further strengthen the believe that, acknowledgement enhances scholarly contribution and visibility of authors.

Methodology

The printed version of *International Journal of Computer Vision* was used as the database for the study.Cronin, Mckenzie and Rubio (1993) acknowledgement typology was used in the classification of the data for the study. The typology consists of six entries.

They are as follows:-

---Access
---Peer Interactive Communication (PIC)
---Moral Support
---Technical Support
---Clerical Support
---Financial Support

All the articles written in the literature that appeared in the *International journal of Computer Vision* are thoroughly examined to locate acknowledgements and the results were classified according to the above mentioned typology. Two of the above mentioned categories, (a) Financial Support (b) Peer Interactive

Communication (PIC) were further treated separately as examples. These could give more understanding of the acknowledgement activities. Tables were also used to further exhibit the findings of the study appropriately. Balnaves and Caputi (2001) are of the view that, "Tables and graphs can be used for trends, clusters or groupings."

Findings and Discussion.

(a)Acknowledgements in the International journal of computer vision.

The practice of acknowledgements in the journal articles that appeared in the *International journal of computer vision* could be said to be a common practice. Table 1 reveals that out of 369 articles published in the journal, 250(68%) are acknowledged. Furthermore the maximum number of articles (77%) contained acknowledgements in year 2003; while the minimum number of articles (65%) was recorded in the year 2006. Generally, the table exhibit that a very significant number of scholars in this discipline recognized and practiced acknowledgement activities in their scholarship communications. Also the table shows that, the gap between the maximum and the minimum number of acknowledgement statements was not much. This clearly indicates the extent to which acknowledgement activities are practiced in the literature of computer vision.

(b) *Frequency distribution of acknowledgements*.

In the frequency distribution of acknowledgements in this discipline, Table 2 exhibit that,
the highest number of acknowledgement per article (2.9) was recorded in the year 2006; while the lowest (1.9) was recorded in the year 2001. On the average each article published in this journal contained 2.3 acknowledgements.

(c) *Acknowledgements by category*.

Six categories were exhibited in Table 3 and information concerning the extent of acknowledgement in them was also highlighted. The largest number of acknowledgement statements was recorded in the Financial Support Category (37%).This finding do not corroborate with that of Tiew and Sen (2002) who found out that, the largest number of acknowledgements were in the category of Technical Support. It also goes against the findings of Rong, Grant and Ward (1989) who examined funding acknowledgements in relations to research productivity and conclude that, "We consider whether funding might account for patterns by examining acknowledgement of support in published articles(by women publishers and researchers). We found no significant relationship among author, gender, article topic, and notation of internal funding. Funding therefore do not appear to account for increased productivity by women and gender researchers." The next category was Peer Interactive Communication, PIC (25%), followed by Technical support category (10%), Also Access category has (10%), and then followed by Moral Support Category (9%) and the least category was Clerical Support with (6%).

(d) *Financial support acknowledgements*.

From the data in table 5 more information could be understood concerning the financial support acknowledgements in the period understudy. The highest number of financial acknowledgements (88%) was recorded in the year 2001; while the lowest number of acknowledgement (72%) was recorded in the year 2004. The mean of the data can be seen very conspicuously in the table. This category has the highest mean of (86%) mainly because it has the highest number acknowledgement statements among the categories examined.

(e) *Peer Interactive Communication (PIC) acknowledgements*.

Information can easily be discerned from table 4 concerning the spread and distribution of (PIC) acknowledgements as it appeared in the *International Journal of Computer Vision*. The highest number of the (PIC) acknowledgements (63%) can be seen clearly in the year 2005; while the lowest number (50%) can easily be spotted in the years, 2001 and 2002. The mean of the data is (57%). This figure is not too low when compared with journal of natural rubber research (61%), journal of Documentation (57%). But when compared with the findings of (Cronin, McKenzie and Rubio, 1993), this finding on computer vision is quite low. They found out that, Psychology review has (78.1%), American Sociology review has (92.6%), American historical review has (83.7%), and Mind has (95.5%).

Conclusion

In conclusion the following important points should be taken in to consideration.

---Acknowledgement activities among computer scientists are being commonly practiced in their scientific communications through out the period of the study. This can be seen
from the findings, that (68%) of the articles that appeared in the *International journal of computer vision* are acknowledged.

---To further confirm the above statement, each article published in the journal contained

2.3 acknowledgements averagely.
---The finding also indicates that the most common acknowledgement activity is the financial support category which accounts for (37%).

It is hoped that further investigative studies could be conducted to explore specific aspects of literature as it relates to acknowledgement. A similar exploratory research could also be done in other disciplines. Journal articles could be analyzed to find the traces of acknowledgement in a given subject. The result may be used to determine the productivity of the authors. Lo (2010) says, "During the past several decades, plenty studies were done to show the productivities and research impact. There are quite an amount of studies which applied the methods adopted from bibliometrics while periodical articles were used for analyzing."

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Table, 1; Acknowledgements in the journal of computer vision.

Year	Number of articles	Number of articles with acknowledgements	%
2001	50	34	68
2002	68	50	73
2003	44	34	77
2004	62	36	58
2005	56	38	68
2006	89	58	65
	369	250	68

Table, 2: Acknowledgements per article

Year	Number of articles	Number of acknowledgement in articles	Mean
2001	34	64	1.9
2002	50	109	2.2
2003	34	68	2.0
2004	36	82	2.2
2005	38	80	2.1
2006	58	166	2.9
	250	569	2.3

Table, 3: Categories of Acknowledgements

Year	MS	FS	A	CS	TS	PIC	Total
2001	4	30	1	0	12	17	64
2002	18	33	10	7	16	25	109
2003	5	26	5	3	9	20	68
2004	9	26	14	5	8	20	12
2005	3	30	7	6	10	24	80
2006	11	70	20	13	17	35	166
Total	50	215	57	34	72	141	569
%	9	37	10	6	13	25	100

Key:
MS- Moral support
FS-Financial support
A-Access
CS- Clerical supply
TS- Technical support
PIC-Peer interactive communication

Table, 4: Peer Interactive Communication (PIC) Acknowledgements

Year	AA	PICA	%
2001	34	17	50
2002	50	25	50
2003	34	20	59
2004	36	20	55
2005	38	24	63
2006	58	34	60
Total	250	141	57

Key
AA-Articles with acknowledgements
PICA-Peer interactive communications acknowledgements

Table, 5: Financial support.

Year	AA	FA	%
2001	34	30	88
2002	50	33	66
2003	34	26	76
2004	36	26	72
2005	38	30	79
2006	58	70	83
Total	250	215	86

Key:
AA-Articles with acknowledgements
FA- Financial acknowledgements

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